Patent Claims

1. A process for coating a substrate (1) with at least one functional layer (2), comprising the steps of:

a) providing the substrate (1) and the layer starting material in a vacuum system (5), and

b) coating the substrate (1) with a functional layer (2) by sputtering of the layer starting material, wherein

b1) the sputtering of the layer starting material for coating of the substrate (1) with a functional layer (2) is interrupted at least once to produce an intermediate layer (4), which is different than the functional layer and has a thickness of ≤ 20 nm,

b2) the sputtering of the layer starting material is continued after the interruption.

2. The process for coating a substrate (1) as claimed in claim 1, wherein the coating of the substrate (1) by means of a functional layer (2) is realized by means of magnetron sputtering of the layer starting material.

3. The process for coating a substrate (1) as claimed in claim 2, wherein the functional layer is applied by means of a magnetron sputtering process as described in EP 0 516 436 B1.

4. The process for coating a substrate (1) as claimed in one of the preceding claims, wherein a plurality of functional layers (2) are applied, in particular as an alternating layer system made up of functional layers (2) with a low refractive index and functional layers (2) with a high refractive index.

5. The process for coating a substrate (1) as claimed in

claim 4, wherein the functional layers (2) with a low refractive index are interrupted by sputtering intermediate layers (4) with a high refractive index and/or the functional layers (2) with a high refractive index are interrupted by sputtering intermediate layers (4) with a low refractive index, the intermediate layers remaining below a thickness at which they become optically active, preferably ≤ 10 nm.

6. The process for coating a substrate (1) as claimed in claim 5, wherein the functional layers (2) with a low refractive index and the intermediate layers (4) with a low refractive index consist of SiO_2 by virtue of silicon being sputtered in a reactive atmosphere, and the functional layers (2) with a high refractive index and the intermediate layers (4) with a high refractive index consist of ZrO_2 by virtue of zirconium being sputtered in a reactive atmosphere.

7. The process for coating a substrate (1) as claimed in one of claims 1 to 3, wherein a pure metal layer is applied as functional layer (2) by sputtering a metal.

8. The process for coating a substrate (1) as claimed in claim 7, wherein the interruption to the sputtering of the functional layer (2) is effected by introducing an oxygen-rich microwave plasma into the vacuum chamber, with an intermediate layer (4) consisting of metal oxide by virtue of the surface of the functional layer (2) of metal which has previously been grown being oxidized.

9. The process for coating a substrate (1) with a functional layer (2) as claimed in claim 8, wherein the functional layer (2) is applied by sputtering chromium.

10. The process for coating a substrate (1) as claimed in one of the preceding claims, wherein the substrates (1), on a

drum (7) located inside the vacuum chamber, rotate past targets (10, 11, 12) comprising the layer starting materials and an oxygen source (8).

11. A coated substrate (1) having at least one functional layer (2) formed from a metal, wherein the functional layer (2) has at least one intermediate layer (4) of a metal oxide which interrupts it and is ≤ 10 nm thick.

12. The coated substrate (1) as claimed in claim 11, wherein the functional layer (2) is a chromium layer.

13. The coated substrate (1) as claimed in one of claims 11 and 12, wherein the interrupting intermediate layer (4) of a metal oxide is a chromium oxide layer.

14. The coated substrate (1) as claimed in one of claims 11 to 13, which is producible by the process as claimed in claims 7 to 10.

15. The coated substrate as claimed in one of claims 11 to 14, which is used as a substrate for lithographic processes.

16. A coated substrate (1) having at least one functional layer (2) of a metal oxide, wherein the functional layer (2) has at least one intermediate layer (4) of a metal oxide which interrupts it and remains below a thickness at which it is optically active.

17. The coated substrate (1) as claimed in claim 16, which comprises an alternating layer system made up of functional layers with a high refractive index and functional layers with a low refractive index.

18. The coated substrate (1) as claimed in claim 17, wherein the functional layer (2) with a low refractive index consists of SiO_2 and the functional layer (2) with a high refractive index consists of ZrO_2.

19. The coated substrate (1) as claimed in claim 18, wherein the interrupting intermediate layer (4) of a metal oxide in a functional layer (2) with a high refractive index formed from ZrO_2 is an intermediate layer (4) with a low refractive index formed from SiO_2, and the interrupting intermediate layer (4) of a metal oxide in a functional layer (2) with a low refractive index formed from SiO_2 is an intermediate layer (4) with a high refractive index formed from ZrO_2.

20. The coated substrate (1) as claimed in one of claims 16 to 19, which is producible by the process as claimed in claims 4 to 6.

21. The coated substrate as claimed in one of claims 16 to 20, which is used as an optical element.

22. The coated substrate as claimed in claim 21, which is used as a color filter.

23. The coated substrate as claimed in one of claims 11 to 22, wherein the functional layer is an optical functional layer.